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Fig. 15. Surface view of lower epidermis containing stomata.

Fig. 16. Longitudinal section of mature stem taken late in season when growth in thickness had ceased and all of the tissues were in permanent condition. (a) epidermis, (b) cortex, (c) schlerenchyma, (d) pith, (e) xylem, (f) phyloem.

Fig. 17. Cross section of the same. (a) epidermis, (b) cortex, (c) schlerenchyma, (d) pith, (e) xylem, (f) phloem.

Fig. 18. Longitudianl section of mature rhizome. (a) epidermis, (b) cortex, (c) cell containing raphides, (d and e) sheaths of elongated cortical cells, (f and g) xylem, (h) phloem. The bundle is amphivasal, and a duct is shown at the extreme right.

Fig. 19. Cross section through the mature rhizome. (a) epidermis, (b) cortex, (c) cell with raphides, (d) starch granules, (e) xylem, (f) phloem in an almost amphivasal bundle, (g) sheath of cortical cells, (h) a small typical collateral bundle.

Fig. 20. Cross section in detail through a more typical amphivasal bundle from center of an old rhizome. (a and b) sheath layers, (c) xylem, (d) cells which will later from xylem, (e) cortex, (f) phloem.

Fig. 21. Cross section of a small secondary root. (a) epelbema, (b) outer palisaded layer of periblem, (c) ordinary periblem cells, (d) endodermis, (e) pericycle, (f) phloem, (g) xylem.

Fig. 22. Cross section of the wood bundle from the tip of a larger seconadry root on an older part of the plant. (a) periblem, (b) endodermis, (c) periclycle, (d) xylem, (e) phloem, (f) cells which form meta-xylem, (g) pith cells.

The scale of magnification accompanies each figure.

ABNORMAL FLOWERING OF HEPATICA.

BY J. A. NIEUWLAND.

The tendency to redundancy of sepals in Hepatica, our common liver-leaf, a plant that adds so much to the beauty of our early spring woods, was noticed several hundred years ago by Lobelius[1] or as he is also known de l'Obel. He even gave the double flowered plant the varietal name, customary in those days, calling it *Hepatica trifolia polyanthos*, or doubled flowered *Hepatica trifolia*. Parkinson[2] in 1629 also describes such plants under practically the same name. The Liverleaf itself was even earlier called Hepatica by Bock[3] in Brunfels great work of botany, the first that included good natural lifelike illustrations of plants in the sixteenth century.

Since in this plant it may be considered that the so-called "sepals" arise by the change of the stamens into these in doubling, and that the latter proportionately diminish in number and often disappear entirely not only when cultivated but also wild, it is probably worth while considering them at least in part as real petals. The flowers of the plant are then to be considered as really rather asepalous than apetalous. Such double 1 flowers have been found as intimated even in their native haunts in perfectly wild conditions.

Color variations are even more common. A hillside of plants of *H. acuta* was seen during the last season where the flowers ranged from perfectly pure white through lavender, pink, rose, purple, all with or without darker margins to light blue dark blue and even the darkest violet, all the plants being indiscriminately scattered over the hillside facing the sun. I could only account for this wonderful show of color variation from the fact that the previous fall the area had been burnt over. A imilar condition seemed to cause all or nearly all of the plants of *Viola populifolia*, our common blue violet, to have blotched and streaked petals on their flowers. These violets were found in this condition only where the leaves were burnt away the year before. Some of these were transferred to a garden and bloomed the second season with similarly blotched flowers, blue and white streaked.

A plant of *Hepatica* was found in which all the bracts were very close to the flower parts, in fact almost on the torus of the flower. These bracts were distinctly three-lobed and seemed to approximate the shape of the true hepatica leaves in being very broad, whereas the ordinary bracts are usually oval and quite entire or ovate. In the flowers of this plant the outer "sepals" colored in the typical plant were here green and herbaceous on the margins. This would seem to indicate a tendency on the part of the "sepals" to become bractlike or become real green sepals. As there are in most plants of *Hepatica* two more or less complete whorls of the so-called "sepals" it were perhaps not incongruous to consider that these plants have both real sepals and real petals in more or less complete whorls usually alike, butin such cases atavistically tending to differentiate themselves, the outer gradually changing themselves under normal conditions into bracts gradually, and the inner similarly showing by the change of stamens into them that there is no break in the number of floral envelopes.

Another anomalous condition of inflorescence in this plant was seen at the same time in a number of individuals. One of these had beside the normal one-flowered about six others with two or three subsessile flowers in the bracts. In one instance the third flower was neutral having "sepals" alone. This condition was not one of fasciation as the usual flattened peduncles of greater diameter in one way were absent and the stalks appeared no different than in normal. In several cases the usual three bracts were present and the supernumerary flowers came from these in umbel fashion. In one case two flowers were found at the end of a common pedicel (bracts some distance below) and on a common receptacle or double torus. In several the outer bracts of the cluster were 2 to 3-lobed or notched. The several flowers had very distinct pedicels nearly all with their own secondary bracts and only one bractless. In another a bent one-bracted node or joint was found at the base of the several pedicels of the umbel-like cluster. Still, another more peculiar specimen consisted of a peduncle with a larger bract near the top. From the axis of this arose two pedicels, one with a normal flower, the other with two flowers on a common torus. The larger of these two had three three-nothced bracts and the other two three-notched bracts at the apex.

A CORRECTION NEEDING CORRECTION.

Some years ago the term macrospore for the larger non-sexual speciallized reproductive cell of the heterosporous pteridophyta was found objectionable because the name was deemed inaccurate in meaning. The word μαϰϱός (macros) in Greek means "long" and the spores in question are not long but large, or big. It might have been thought by some more or less conservative botanists of the "laissez faire" type that the attempt at correction might be considered as fastidiousness. Scientists, however ought to be exact especially in their terminology, though an equally industrious attempt to correct nomenclature usually raises a clamor among the morphologists who carp at continual name changing. Be this as it may, the object in question suggests rather the idea of largeness, and hence ought to have come from the Greek word μέγας (megas). The name was accordingly changed to "megaspore" and in a few months it was even enthusiastically received by all without exception, and, as far as we